In the Specification

Kindly replace first paragraph on page 1 as follows:

TECHNICAL FIELD

~~The present invention~~ This disclosure relates to a base fabric for airbags, which is coated with a resin elastomer on its surface and which has good mechanical properties, heat resistance, compactness and containability, and relates to a method for manufacturing it.

Kindly replace second paragraph on page 1 as follows:

BACKGROUND

At present, airbags are indispensable for ensuring the safety of drivers and passengers in automobiles, and the percentage of airbag installation in automobiles is increasing.

Kindly replace third paragraph on page 1 as follows:

The requirement for improved reliability of airbags as safety devices is even more increasing, and the other requirements for compactness and cost reduction of airbag devices are also further more increasing. Accordingly, ~~much~~ more improvements are required for base fabrics for airbags and for the process of producing yarns and base fabrics for airbags so as to satisfy the above-mentioned requirements.

Kindly replace first paragraph on page 6 as follows:

~~DISCLOSURE OF THE INVENTION~~

~~An object of the present invention is~~ It could therefore be advantageous to provide a base fabric for airbags that has well-balanced properties of flame resistance, complete air-imperviousness and compactness that could not be attained by any conventional non-coated or coated base fabrics for ~~airbags. Specifically, the invention provides~~ airbags and to provide a coated base fabric for airbags that satisfy both good safety and good containability, or that is, for those which are thin and have

good mechanical properties and good heat resistance and, when they have expanded, release substantially no gas except through the vent hole thereof, and which have good flexibility, compactness and containability.

SUMMARY

~~Specifically, the invention provides~~ We provide a coated base fabric for airbags, which is prepared by coating a base fabric with a resin coat that has good flame resistance and enables substantially zero ~~air-pervious-ness~~ air-perviousness and which has improved compactness and containability, and provides a method for producing it.

Kindly replace second paragraph on page 6 as follows:

~~Another object of the invention is to provide a coated base fabric for airbags that satisfy both good safety and good containability, or that is, for those which are thin and have good mechanical properties and good heat resistance and, when they have expanded, release substantially no gas except through the vent hole thereof, and which have good flexibility, compactness and containability.~~

Kindly replace paragraph spanning pages 6 and 7 as follows:

~~The invention is~~ We also provide a coated base fabric for airbags, which is fabricated by applying a resin elastomer to a base fabric formed of flattened cross-section yarns having a degree of filament cross-section flatness (that is, a ratio of the major axis length to the minor axis length of the filament cross-section) of from 1.5 to 8, and which is characterized in that the filaments are aligned in the base fabric in such a manner that the total average horizontal index (HI) represented by the following formula falls within a range of from 0.75 to 1.0, and the amount of the resin elastomer adhered to the fabric is from 0.1 to 60 g/m^2:

$$HI = (\Sigma hi)/f$$

wherein

$hi = \cos\theta$,

θ indicates the angle between the major axis direction of each filament and the horizontal direction of the fabric,

f indicates the number of the filaments.

Kindly replace first paragraph on page 7 as follows:

The following (a) to (d) are preferred ~~embodiments~~ aspects of the coated base fabric for airbags ~~of the invention~~. Satisfying these conditions produces further better results.

(a) The horizontal index (HI) falls between 0.85 and 1.0.

(b) The amount of the resin elastomer adhered to the fabric is from 5 to 30 g/m^2.

(c) The coated base fabric satisfies the following conditions (1) to (4):

(1) Cover factor: 1500 to 2400,

(2) Tensile strength: 500 to 750 N/cm,

(3) Tear strength: 200 to 400 N,

(4) Thickness: 0.20 to 0.35 mm.

(d) The flattened cross-section yarn is formed of a polyamide having a sulfuric acid-relative viscosity of at least 3.0.

Kindly replace first paragraph on page 8 as follows:

~~The invention~~ We also ~~provides~~ provide a method for producing the coated base fabric for airbags, which comprises applying a resin elastomer to a base fabric formed of flattened cross-section yarns having a degree of filament cross-section flatness (that is, a ratio of the major axis length to the minor axis length of the filament cross-section) of from 1.5 to 8, and which is characterized in that a tension of from 0.05 to 0.6 cN/dtex is given to the warp and the weft in

weaving them so that the woven fabric may have a total average horizontal index (HI) represented by the following formula falling within a range of from 0.75 to 1.0:

$$HI = (\Sigma hi)/f$$

wherein

$hi = \cos\theta$,

θ indicates the angle between the major axis direction of each filament and the horizontal direction of the fabric,

f indicates the number of the filaments.

Kindly replace paragraph spanning pages 8 and 9 as follows:

The following (e) to (h) are preferred ~~embodiments~~ aspects of the method for producing the non-coated base fabric for airbags ~~of the invention~~. Satisfying these conditions produces further better results.

(e) The coated base fabric for airbags is produced so that it may satisfy the following conditions (1) to (4):

(1) Cover factor: 1500 to 2400,

(2) Tensile strength: 500 to 750 N/cm,

(3) Tear strength: 200 to 400 N,

(4) Thickness: 0.20 to 0.35 mm.

(f) After the warp and the weft are woven with a tension of from 0.05 to 0.6 cN/dtex given thereto, the resulting fabric is heated under pressure.

(g) The heating temperature falls between 180 and 220°C; and the linear load for pressure falls between 3000 and 10000 N/cm.

(h) The number of entanglements of the flattened cross-section filaments yarn is from 3 to 20/m, and

the fabric is so woven that the number of entanglements of the flattened cross-section filaments yarn in the fabric is at most 3/m.

Kindly replace first paragraph on page 9 as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a graphic view showing examples of the filament cross-section profile of the yarn for the base fabric ~~of the invention~~.

Kindly replace second paragraph on page 9 as follows:

Fig. 2 is a graphic view showing examples of the cross-section profile of the orifice of the spinneret used herein for producing flattened cross-section yarn for the base fabric ~~of the invention~~.

Kindly replace first paragraph on page 10 as follows

~~BEST MODES OF CARRYING OUT THE INVENTION~~ DETAILED DESCRIPTION

~~The invention is described in detail hereinunder.~~

The coated base fabric for airbags ~~of the invention~~ is formed of synthetic fibers such as polyamide fibers, polyester fibers, polyolefin fibers, polyvinyl alcohol fibers and the like, and the material of the fibers is not specifically defined. Polyamide is preferred for the material. Polyamide fibers include fibers of polyhexamethylene (N66), polycapramide (N6), polytetramethyleneadipamide (N46), and copolymers and blends of such polymers.

Kindly replace paragraph spanning pages 10 and 11 as follows:

The fabric ~~of the invention~~ is widely used in various applications for industrial materials such as those for airbags. For it, therefore, it is desirable to use fibers that contain various additives of heat-resisting agent, light-proofing agent and antioxidant in order that the fabric could have chemical resistance, for example, it may have high-level heat resistance, weather resistance and oxidation resistance. In polyamide fibers, for example, usable are various copper salts such as

copper acetate, copper iodide, copper bromide, cupric chloride, as well as inorganic or organic copper complex salts; alkali metal or alkaline earth metal halides such as potassium iodide, sodium iodide, potassium bromide, lithium chloride, calcium chloride; hindered phenol-type antioxidants, diphenylamine-type antioxidants, imidazole-type antioxidants, inorganic or organic phosphorous compounds and UV-absorbents, and manganese salts. Regarding their content, the amount of the metal salts may be generally from 10 to 100 ppm in terms of metal, and the amount of the other additives may be from 500 to 5000 ppm or so.

Kindly replace paragraph spanning pages 11 and 12 as follows:

The filament cross-section profile of the yarn for the coated base fabric for airbags ~~of the invention~~ is generally oval as in Fig. 1(A), or corner-rounded rectangular oval as in Fig. 1(B). Apart from such oval profiles, it may be any others of which the major axis (a) and the minor axis (b) satisfy the relationship mentioned below. For example, it includes not only bilateral symmetric configurations such as rectangles, diamonds, cocoons, but also bilateral asymmetric configurations or their combinations. In addition, the basic configurations as above may be modified to have projections or recesses or to have hollows, not detracting from the ~~effect of the invention~~ airbag.

Kindly replace paragraph spanning pages 12 and 13 as follows:

Of the flattened cross-section yarns ~~for use in the invention~~, the degree of filament cross-section flatness (the ratio of the major axis length to the minor axis length of the filament cross-section) must be indispensably from 1.5 to 8, but is preferably from 2 to 6. Using the flattened cross-section yarns falling within the range makes it possible to align the constitutive filaments in such a manner that the major axis thereof could be in the horizontal direction of the base fabric. As compared with ordinary circular cross-section yarns, the fabric of the flattened cross-section yarns of the type may be thinned and its containability is better. If the degree of flatness is smaller than 1.5,

then the yarns will be near to circular cross-section yarns and could not enjoy the effect of flattened cross-section yarns. On the other hand, if the degree of flatness is over 8, then the effect of the flattened cross-section yarns will be saturated and, in addition, it may produce a problem in that high-tenacity and high-toughness fibers of high quality could not be made stably.

Kindly replace paragraph spanning pages 14 and 15 as follows:

The coated base fabric for airbags ~~of the invention~~ is formed of the specific flattened cross-section yarns as above, and it is the greatest and the most important characteristic that, in the cross-section of the base fabric, the major axis direction of the filament cross-section of the yarns of the warp and the weft that constitute the base fabric is oriented in the horizontal direction of the base fabric. In other words, when the base fabric for airbags ~~of the invention~~ is cut in the direction vertical to the warp thereof and when the cross-section of the warp is observed, then the major axis of the flattened cross-section thereof is oriented in the direction substantially parallel to the weft direction of the base fabric. Similarly, when the base fabric is cut in the direction vertical to the weft and when the cross-section of the weft is observed, then the major axis of the flattened cross-section thereof is regularly oriented in the direction substantially parallel to the warp direction of the base fabric.

Kindly replace paragraph spanning pages 17 and 18 as follows:

The cover factor of the base fabric is directly correlated with the containability such as the thickness and the flexibility thereof, and with the mechanical properties such as the tensile strength and the tear strength thereof, and it is important that the cover factor of the base fabric falls within a suitable range. In the base fabric for airbags ~~of the invention~~, the constitutive filaments have flattened cross-section, and they are regularly aligned in the horizontal direction of the base fabric. Therefore, the covering property of the fabric is extremely good, and the cover factor thereof may be

lowered by 10 to 30% as compared with that of ordinary base fabrics formed of circular cross-section yarns. The possibility of reducing the cover factor enables to reduce the amount of the yarns to constitute the fabric and enables to reduce the count of the constitutive yarns, and therefore, the time necessary for weaving the fabric may be shortened and the cost of the base fabric for airbags may be thereby reduced.

Kindly replace paragraph spanning pages 18 and 19 as follows:

In particular, the coated base fabric for airbags ~~of the invention~~ is characterized in that the tear strength thereof is high relative to the tensile strength thereof. Though depending on the filament fineness thereof, the ratio of the tear strength to the tensile strength of a fabric of ordinary circular cross-section yarns falls almost between 1/2.5 and 1/1.5 or so, and it decreases with the reduction in the filament fineness of the yarns. On the other hand, the ratio of the tear strength to the tensile strength of the base fabric for coated airbags ~~of the invention~~ falls between 1/1.5 and 1/1.2 or so, or that is, the tear strength of the fabric is high relative to the tensile strength thereof, and, in addition, the base fabric ~~of the invention~~ is characterized in that the ratio of the tear strength to the tensile strength thereof decrease little even when the filament fineness of the constitutive yarns decreases. This is effective for preventing the propagation of broken sites such as tears and holes formed in the surface of the base fabric owing to the shock given thereto. The flattened cross-section filaments to constitute the coated base fabric for airbags ~~of the invention~~ have an extremely good covering capability and they are packed to a high density and woven into the fabric. In the base fabric, therefore, the woven filaments would behave as if they were bundled into one flattened filament, and could express such a high tensile strength.

Kindly replace paragraph spanning pages 19 and 20 as follows:

Preferably, the thickness of the coated base fabric for airbags ~~of the invention~~ is from 0.20

to 0.35 mm. Having the thickness that falls within the range, the base fabric is sufficiently resistant to heat of the high-temperature gas that is jetted out from an inflator, and therefore may be favorably built in small-sized cars that require more severe containability. The thickness of the coated base fabric for airbags ~~of the invention~~ may be reduced by about 15% or more, as compared with those formed of conventional circular cross-section yarns having the same cover factor. This confirms the superiority of the base fabric ~~of the invention~~ in point of the compactness and the containability thereof.

Kindly replace paragraph spanning pages 20 and 21 as follows:

The amount of the resin elastomer to be adhered to the base fabric for airbags ~~of the invention~~ is from 0.1 to 60 g/m^2, preferably from 5 to 30 g/m^2, more preferably from 10 to 20 g/m^2. If the coating resin amount is less than 0.1 g/m^2, then the entire surface of the base fabric could not be uniformly coated with the resin even though it is formed of the flattened cross-section yarns ~~of the invention~~, and if so, gas leakage will occur in bag expansion and the fabric will have a risk of burst. On the contrary, if the coating resin amount is over 60 g/m^2, then the containability and the flexibility of the coated fabric will be poor even through the flattened cross-section yarns are used in forming the fabric ~~and the object of the invention could not be attained~~. Since the base fabric ~~of the invention~~ is characterized in that the constitutive filaments has a flattened cross-section profile and the major axis of the filament cross-section is regularly oriented in the horizontal direction of the base fabric, its surface is more flattened as compared with those of ordinary circular cross-section yarns, and therefore can be coated thinly and uniformly with a resin elastomer. As a result, the base fabric is thin and flexible and its containability is improved. The surface of a base fabric formed of ordinary circular cross-section yarns is roughened, and therefore when it is entirely coated with resin, then the necessary amount of the resin will be larger than that for the base fabric ~~of the invention~~.

Kindly replace first paragraph on page 21 as follows:

One example of a method for producing the coated base fabric for airbags ~~of the invention~~ is described below.

Kindly replace second paragraph on page 21 as follows:

As ~~so~~ mentioned hereinabove, the synthetic fibers having a flattened cross-section for use in the coated base fabric for airbags ~~of the invention~~ may be various polymer fibers. Polyamide is preferred for obtaining high-tenacity and high-toughness fibers. In particular, high-viscosity nylon 66 polymer having a sulfuric acid-relative viscosity of from 3.0 to 4.0 is preferred.

Kindly replace third paragraph on page 21 as follows:

For producing the fibers, a polymer is melted, filtered and spun out trough orifices of a spinneret. The spinneret is so designed that its orifices could have a flattened cross-section as specifically defined for the cross-section of the constitutive filaments ~~in the invention~~. In particular, the spinneret orifices are designed in consideration of the change of the cross-section profile of the spun yarns owing to the surface tension thereof while they are cooled and solidified after having been spun out.

Kindly replace paragraph spanning pages 21 and 22 as follows:

For example, in order to obtain the fibers having an oval cross-section profile as in Fig. 1(A), the spinneret orifice may be so designed as to have a rectangular profile as in Fig. 2(A). The vertical length c of the rectangle and the horizontal length d thereof shall be suitably determined in accordance with the filament fineness and the degree of flatness of the fibers to be obtained. On the other hand, in order to obtain the fibers having a corner-rounded rectangular oval profile as in Fig. 1(A), the spinneret orifice may be so designed that it has small circles at both ends and inside it and the small circles are combined together via a slit, as in Fig. 2(A). In this ~~embodiment~~ aspect, the

number of the small circles and the diameter thereof, the length of the slit and the width thereof, and the vertical length c and the horizontal length d of the overall orifice shall be suitably determined in accordance with the filament fineness and the degree of flatness of the fibers to be obtained. In order that the facing two sides of the cross-section could be linear and more parallel to each other, it is desirable that the number of the small circles is from 4 to 8, the diameter thereof is from 0.1 to 0.3 mm, the width of the slit is from 0.1 to 0.3 mm and the length thereof is from 0.1 to 0.3 mm, though depending on the atmospheric condition after the spinneret.

Kindly replace first paragraph on page 25 as follows:

In the warping and weaving process, the warp tension is suitably controlled so that the flattened cross-section filaments ~~of the invention~~ could be oriented in the horizontal direction of the base fabric to be produced, and the thus-controlled yarns are woven while the implanting tension of the weft is controlled to a suitable degree. The suitable warp tension falls between 0.05 and 0.6 cN/dtex. If the warp tension in weaving is lower than 0.05 cN/dtex, then the total average horizontal index HI which is an important factor ~~in the invention~~ and indicates the alignment condition of the flattened cross-section filaments in the cross-section of the base fabric produced could not be satisfactorily high and, as a result, base fabrics of good flexibility and containability for airbags could not be obtained. On the contrary, if the warp tension is over 0.6 cN/dtex, then the total average horizontal index HI will rather lower and the characteristics of the base fabric for airbags ~~of the invention~~ could not be obtained. In addition, if the warp tension in weaving is too high, then the filaments may be cut and the overall yarns will also be cut, and, as a result, the weaving loom must be stopped. In such a case, the quality of the fabrics produced will lower and the production efficiency will also lower.

Kindly replace paragraph spanning pages 26 and 27 as follows:

In that manner, the flattened yarn base fabric ~~of the invention~~ is obtained in which both the warp and the weft are so aligned that the major axis of the cross-section of the constitutive flattened cross-section filaments is oriented in the horizontal direction of the base fabric.

Kindly replace first paragraph on page 27 as follows:

For more surely and stably expressing the desired effect ~~of the invention~~ and for more remarkably exhibiting the properties of the base fabric ~~of the invention~~ that are better than those of conventional flattened yarn base fabrics, it is desirable that the base fabric obtained as above is pressed under heat for calendering.

Kindly replace paragraph spanning pages 28 and 29 as follows:

~~Some embodiments of the invention are described in detail hereinabove. In the invention, fibers~~ Fibers having a specific cross-section profile and base fabrics having a specific structure are designed. Specifically, ~~in the invention,~~ flattened cross-section yarns of which the cross-section profile has a degree of flatness of from 1.5 t 8 are used, and they are regularly so aligned that the cross-section major axis direction of the constitutive filaments is oriented in the horizontal direction of the base fabric. With that, ~~the invention has~~ we realized two effects: One is that the base fabric is thin and flexible, and the other is that the surface of the base fabric is flattened and is therefore coated thinly and uniformly with a resin elastomer. In addition, the yarns and the base fabric have good mechanical properties of tenacity and elongation. As a result of the above, ~~the invention has~~ we made it possible to provide a coated base fabric for airbags that has good and well-balanced properties necessary for base fabrics for airbags, such as good mechanical properties, heat resistance, complete gas imperviousness (zero gas perviousness), compactness and containability that could not be attained until now.

Kindly replace first paragraph on page 29 as follows:

The flattened cross-section yarns and the coated base fabric for airbags ~~of the invention~~ may be produced with high producibility, not requiring any specific method and apparatus, and their practicability is great.

Kindly replace second paragraph on page 29 as follows:

EXAMPLES

The ~~invention is~~ fabrics are described concretely with reference to the following Examples and Comparative Examples.

Kindly replace first paragraph on page 41 as follows:

As is obvious from Table 1, the fibers having a specific cross-section profile and the coated base fabrics for airbags having a specific structure ~~of the invention~~ are good in that they are flexible and thin and are well containable.

Kindly replace second paragraph on page 41 as follows:

On the other hand, the coated base fabrics for airbags of Comparative Examples 1 to 4 in which the cross-section profile of the fibers and the structure of the base fabrics ~~are outside the scope of the invention~~ are inferior to ~~those of the invention~~ ours in point of the flexibility and the containability thereof. In addition, in Comparative Example 5 in which the degree of flatness of the cross-section of filaments was intended to be 9, nylon 66 fibers could not be produced because of frequent end down in spinning fibers.

Kindly replace first paragraph on page 44 as follows:

As is obvious from Table 2, the base fabrics formed of the flattened yarns ~~of the invention~~ can be uniformly coated with resin even though the coating amount of resin is reduced, and, as a result, the airbags formed of the base fabrics ensure zero air perviousness. As opposed to these,

however, the base fabric formed of circular cross-section yarns in Comparative Example 6 is difficult to uniformly coat with a small amount of resin, and it could not ensure zero air perviousness. After all, the airbag formed of the base fabric is problematic in the safety thereof.

Kindly replace paragraph spanning pages 44 and 45 as follows:

INDUSTRIAL APPLICABILITY

The base fabric for airbags ~~of the invention~~ is coated with resin and has good properties of flame resistance, complete air-imperviousness, flexibility and containability that could not be attained by any conventional non-coated or coated base fabrics for airbags. This is favorable to all types of airbags, such as airbags for drivers, airbags for passengers, side airbags, knee airbags, airbags for inflatable curtains, etc. In addition, when the specific flattened cross-section yarns ~~of the invention~~ are used, then the amount of fibers to be used may be reduced as compared with ordinary circular cross-section yarns, and ~~the invention~~ has another effect of reducing the production costs of airbags.